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SITE 32SN102, STUTSMAN COUNTY, NORTH DAKOTA. A DESCRIPTION AND --ETC(U)
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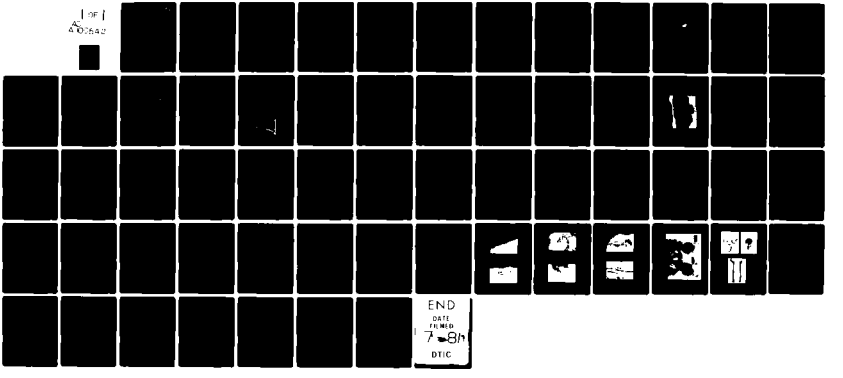

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SITE 32SN102, STUTSMAN COUNTY, NORTH DAKOTA

A Description and Analysis

by

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and

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Dec[redacted]78

In fulfillment of Contract DACW45-78-M-2871 United States Army Corps of Engineers, Omaha District

ABSTRACT

Site 32SN102 is situated on the east side of Pipestem Lake, a man-made reservoir in Stutsman County, North Dakota. The site appears to be a secondary burial containing the remains of four individuals. Bone fragments were radiocarbon dated at 1591 B.C. ± 70. Because the site was being disturbed by lacustrine erosion, the Corps of Engineers, Omaha District contracted with University of North Dakota Archaeological Research, University of North Dakota for salvage investigation. Salvage operations were initiated in August of 1978. Laboratory analyses were conducted later in the fall.

The osteological remains represent two females, a male, and an infant. The latter was aged from 2 to 6 years at the time of death. The male was approximately 40 to 50 years of age and the two females were 18 to 21 and 19 to 25 years old.

No further work is recommended at 32SN102. We do not recommend this site for nomination to the National Register of Historic Places. It is recommended that a complete cultural resource survey be conducted throughout the entire Pipestem Lake area and on some adjacent acreage.

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INTRODUCTION

Under the conditions of Contract #DACW45-78-M-2871, University of North Dakota Archaeological Research (UNDAR), University of North Dakota contracted with the United States Army Corps of Engineers, Omaha District for archaeological investigations at Site 32SN102, a burial site near Jamestown, Stutsman County, North Dakota. The site is located adjacent to Pipestem Lake (see Figures 1 and 2) along Pipestem Creek, the largest tributary of the James River.

The Objectives

The primary purpose of the study was to salvage human osteological materials that were eroding from a cutbank on the east side of the reservoir. Additional objectives included:

1) conducting a comprehensive literature and record search pertaining to the entire Pipestem Lake Project acreage;

2) a description and analyses of osteological materials and other site data;

3) formulating recommendations and mitigative options at 32SN102 and the Pipestem Lake Project acreage; and,

4) compilation of a final report.

Analytical objectives included determination of age, sex, and stature of the human remains as well as their antiquity and cultural affiliations. We also felt that an attempt to reconstruct the mortuary setting as it may have existed prior to erosional disturbance would be useful.

With the exception of cultural affiliation (no cultural materials were discovered in the site matrix), the objectives were accomplished with reasonable success. Each is addressed in other sections of this report.

The Personnel and Efforts

Richard A. Fox served as the Principal Investigator and Project Supervisor. Jay Pearson assisted in the field and the laboratory. Field investigations began on 14 August 1978 and terminated on 18 August 1978. Man-hours expended in the field totalled 100 hours (including travel). Laboratory analyses began on 15 September 1978 and continued, on a part-time basis, through 30 November 1978. It is estimated that 203 man-hours were devoted to osteological description and analyses and report research and preparation (including the literature search).

To satisfy legal requirements, we contacted the Stutsman County coroner (Dr. Kostick) while in the field. Dr. Kostick visited the site on 17 August 1978 and also viewed the osteological remains. He determined that the human remains were not Euro-American and that completion of a Certificate of Death was not necessary. It was also agreed that the remains should be removed to the University for analysis.

Dr. Betty Lee Brandau of the Center for Applied Isotope Studies - Geochronology Lab, University of Georgia processed our radiocarbon dating sample (bone).

THE SETTING

Presently, much of the lower Pipestem valley is inundated by a man-made reservoir. Site 32SN102 is situated in an eroded cutbank approximately 500 m north of the rolled earthfill dam that impounds the water. The reservoir is approximately 32 km long. Maximum pool elevation is 458.2 m. In August of 1978 the pool elevation was 443.5 m. Site elevation is approximately 457 m. The cutbanks at and in the vicinity of the site have been severely eroded by lacustrine processes. These actions exposed the burial matrix, probably in the spring of 1976 or 1977. No doubt many other areas along the reservoir shoreline have undergone erosion and will continue to be eroded. The rate of erosion probably is related to fluctuations in pool elevation and slopewash. Between September of 1977 (when the senior author first visited the site) and August 1978, it appeared that as much as 30 to 50 cm had eroded or slumped from the cutbank.

Previously, Pipestem Creek meandered intermittently (gradient was 0.61 m/km) through a glacial melt water channel to its confluence with the James River. The melt waters cut a 400 to 800 m wide valley some 15 to 30 m into the glacial plain. Much of the creek bottom consisted of alluvial terraces. Above the terraces, the topography rises moderately into the flat, nearly featureless ground moraine above.

Prior to inundation and agricultural activities, minimal stands of gallery forest occurred along the creek channel and floodplain. The forest included American elm (Ulmus americana), cottonwood (Populus sp.), ash (Fraxinus spp.), and boxelder (Acer negundo) (EIS 1970:2) with numerous understory species. The midslopes and upland prairie surrounding the creek valley were treeless. Major vegetation types included, as they exist today, numerous prairie grasses and shrubs (eg. Gramineae, Fabaceae, Rosaceae) (Good et al. 1977). No attempt was made to reconstruct the paleoenvironment of circa 1500 B.C.

The Site

Much of the site matrix and its contents had been eroded away and/or disturbed by amateurs prior to archaeological investigations. Part of the matrix, however, remained exposed in the cutbank from 1.2 to 1.4 m below the surface of the sloping (18 percent slope at the site) valley walls. The original slope terminates abruptly at the cutbank and progresses steeply along an erosional surface to the reservoir below (see Figure 4). The preerosion gradient probably increased somewhat as the slope neared the valley floor. This, at least, is true for the slope from the upland plain to the vicinity of the site. Small runoff drainages flank the slope on which the site is located.

The vertical cutbank averaged 1.9 m in height. In August 1978 there was considerable slump material at the base of the cutbank. The

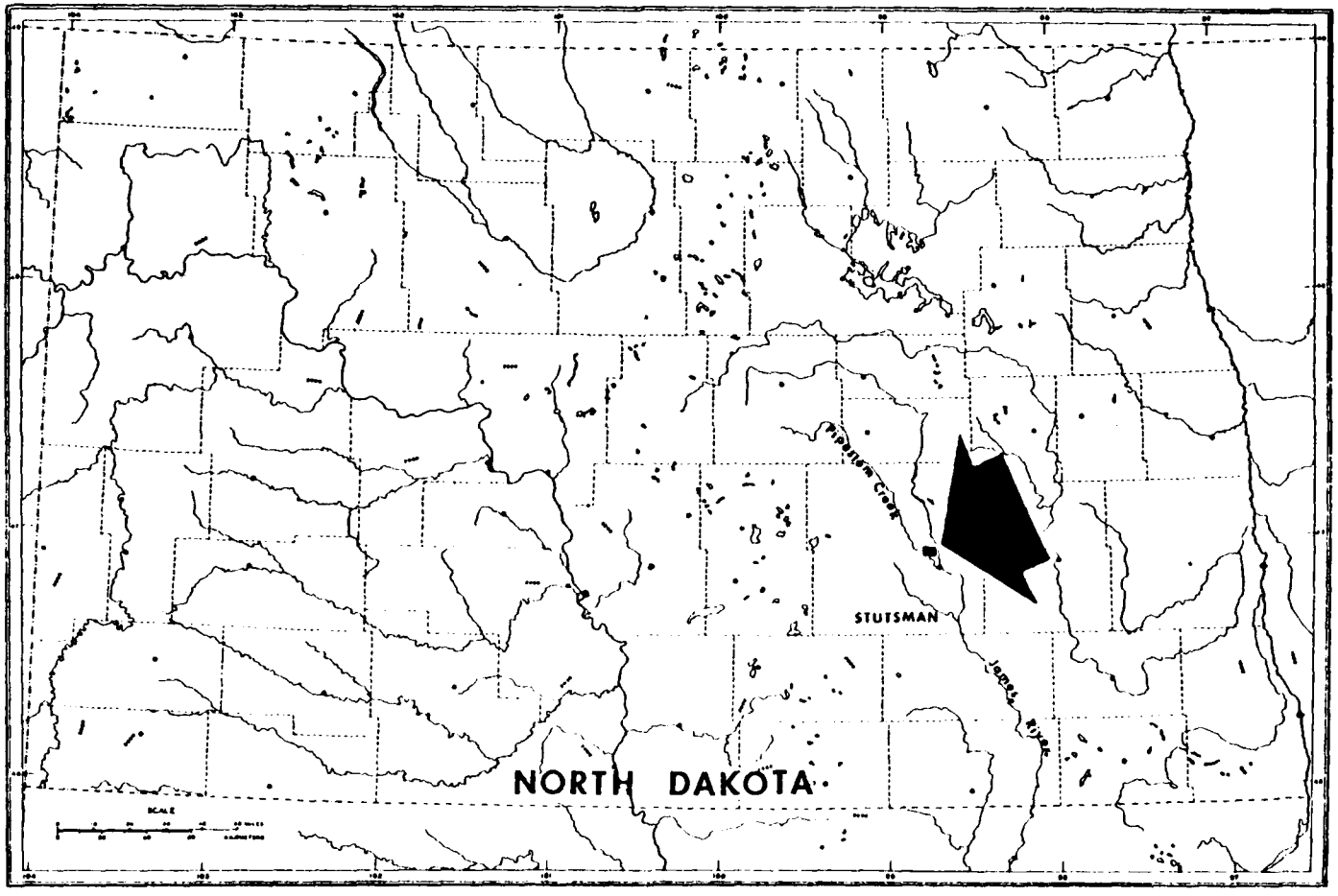


FIGURE 1-General location of site 32SN102. Arrow denotes area depicted in Figure 2.

white stone depicted in Plate 1a was situated upon the slump pile. Previously (in September 1977), a stone similar to this was noted in the cutbank and above the burial matrix. Presumably, this stone slumped from the cutbank. It is not known if this and other stones may have lined or capped a grave or if slopewash caused it to settle above the remains. There are presently no other known archaeological sites in the immediate vicinity of 32SN102.

Incomplete remains of four individuals were recovered from the site. These are herein referred to as Individuals A, B, C, and D. Remains of Individuals B, C, and D had been removed from the site by erosion and pothunters prior to archaeological investigations, thereby destroying any contextual information. The nearly complete skeleton of Individual A was encountered in situ in a sandy clay and sand matrix.

Individual A reposed in an extended, nearly prone position oriented approximately northwest to southeast (Plate 2a). If the radiocarbon date from the bone (ca. 1591 B.C.) can be considered reliable, the burial represents an Archaic manifestation. We presently know nothing of mortuary practices from this time period in North Dakota, but such a provenience seems unusual. This, and the lack of grave goods, opens the possibility that the human remains were not deliberately interred or were interred so hastily that there was no physical evidence of ceremonial pomp. In either case, sustained slopewash activity may or may not have altered the original position of the remains. These hypotheses are discussed further in the Site Interpretation section of this report.

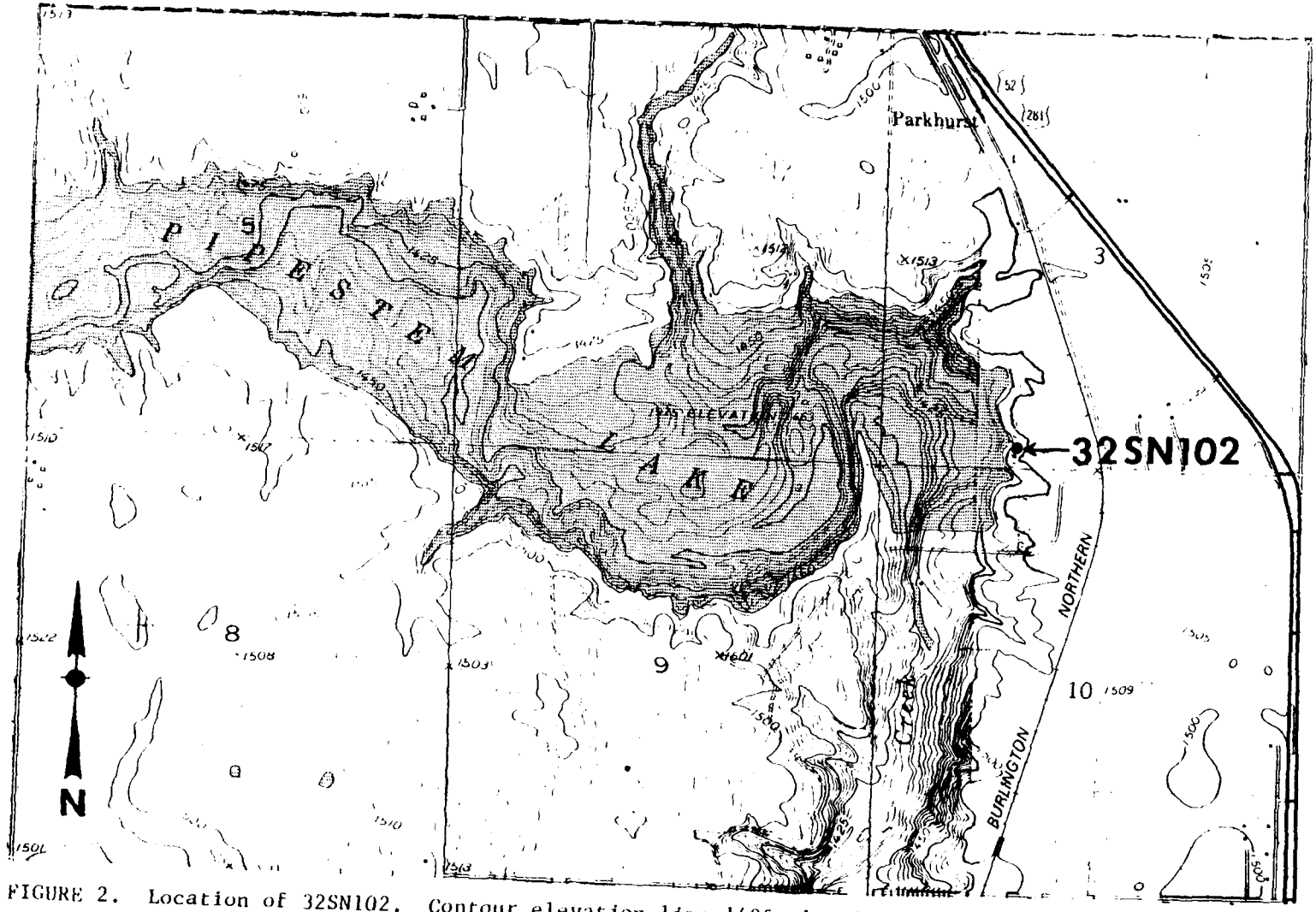


FIGURE 2. Location of 32SN102. Contour elevation line 1425 closely approximates original stream channel. SCALE: One section of land equals one square mile.

PREVIOUS RESEARCH

Literature Search

While in the field, we visited the Stutsman County Historical Society museum in Jamestown. Local volunteers at the museum were unaware of any features or events of historical significance in the Pipestem Lake Project area. A search of the State's Regional Environmental Assessment Program (REAP) files yielded historic information for the general area. It is included in Appendix C.

A search of the North Dakota State Historical Society site files (duplicated at UNDAR) revealed the presence of only two recorded historic sites in the general project area. They are 32SN201 (stone walls and cisterns) and 32SN206 (two-room stone foundation). The latter is located approximately 80 m southwest of Pipestem Creek in Section [redacted]; the former is in Section [redacted]. Both are in Township [redacted] North, Range [redacted] West. These two sites are described in a report by Vehik (n.d.: Section II, 90-91). Undoubtedly there are more historic sites of this type in the Pipestem acreage but they are presently unrecorded because of the absence or inadequacy of professional surveys in the area.

There are presently no cultural resources recorded in the immediate project area that are listed in the National Register of Historic Places or included on the State Register. Consultation with North Dakota Historical Society Offices indicates that none are presently being considered for such listings.

The literature search continued by consulting UNDAR site and site lead files. These files are up-to-date duplicates of those maintained in Bismarck at the Historical Society. In addition, the UNDAR library contains copies of nearly every article, book, and manuscript pertaining to North Dakota archaeology. These facilities were utilized in addition to the University library holdings.

We requested and received from the Corps a copy of the 1970 Environmental Impact Statement prepared on the Pipestem Lake Project. This document states that "no archaeological remains were found" (EIS 1970: 3) in a 1966 survey. There is no other cultural resource consideration given.

Telephone communications included consultations with Nick Franke of the North Dakota Historical Society and a librarian at the Midwest Archeological Center, Lincoln, Nebraska. We discussed the nature of 32SN102 and mitigative options with Mr. Franke. The Midwest Archeological Center library did not contain information that we did not already have.

The Site

Site 32SN102 was first discovered by a non-archaeologist, Mr. Tom Stroh, of Jamestown, North Dakota, in the spring of 1977. Mr. Stroh

collected human bones from the eroded slump material. It is not known whether he also dug into the cutbank to retrieve other bones. He did, however, bring the site to the attention of Nick Franke of the North Dakota Historical Society.

Mr. Franke, a qualified archaeologist, visited the site in early September of 1977. At that time he completed a site form and recommended that the remnants of the site be salvaged. He also brought the site and his recommendations to the attention of the Pipestem dam tender and the Omaha District, Corps of Engineers.

Subsequently, the Omaha District contracted with UNDAR (P.O. DACW45-77-M-3280) to undertake a preliminary onsite investigation, to determine whether or not additional human/cultural materials remained in situ and to recommend mitigative options.

The preliminary, onsite investigation was conducted on 16 September 1977 by the senior author. Results of the investigation were reported in a letter to the Corps dated 19 September 1977. A copy of this letter is included in Appendix B. In summary, it was determined that additional human bones remained undisturbed in the cutbank. It was also clear that future erosion and/or pothunting would eventually destroy any remaining contextual relationships. It was, therefore, recommended that limited salvage excavations be conducted at 32SN102. Also, UNDAR acquired Mr. Stroh's collection for analysis during the September investigations.

As a result of our recommendations of 19 September 1977, the Corps solicited proposals for salvage excavations (and analysis) at 32SN102. UNDAR was awarded the contract.

The Area

In Stutsman County, few, if any, professional archaeological surveys have been conducted west of Range 64 West. UNDAR site files indicate only one site west of this range line. Consequently, little is known of the archaeology along Pipestem Creek and the reservoir area.

North of Jamestown, most of the archaeological activity has been confined to the James River and adjacent areas east of Range 64 West. The earliest known investigations were conducted in 1872 by Cyrus Thomas (1873:655-656) at a site on Pipestem Creek below the dam near present day Jamestown. Mass bundle burials and single secondary burials were excavated from several mounds.

Small boulder-lined depressions are also reported along the James River. Wheeler (1953:9) reports an informant told him that "small groups of Indians camped along the bluffs of Pipestem Creek in tipis erected over shallow boulder-lined pits in the 1870's, whenever they came to hunt buffalo in the area." Apparently these types of features have not yet been recorded along the creek.

In 1946, J.J. Bauxar conducted a 5-day survey of the then proposed Jamestown Reservoir area. His report (Bauxar 1947) contains no information regarding the Pipestem Creek area. A supplement to this report (Wheeler 1953:15-16) mentions four mound sites (32SN19, 32SN20, 32SN21, and 32SN22) on the right bank of Pipestem Creek along the upland bluffs (Sections [redacted], [redacted], [redacted], and [redacted], respectively, T.[redacted]N, R.[redacted]W). Most of these have been disturbed by pothunters.

From his 1952 investigations, Wheeler (1963:228-229) identified the Stutsman Focus, an early Historic Period (ca. A.D. 1750-1800) manifestation characterized, in part, by small circular earthlodges, unfortified semipermanent towns, some transient camps, and secondary burials in eagle trap pits. The human remains at 32SN102 cannot be equated with the Stutsman Focus burial types and, in any case, are much older than the Stutsman temporal parameters.

There is, however, one burial site (32SN31) in the area that exhibits some similarities to 32SN102. It is located in the [redacted] of Section [redacted], T.[redacted]N, R.[redacted]W, less than 4.8 km southeast of 32SN102. At this location, Wheeler (1952) reported a single, shallow (70 cm deep) burial pit containing the incomplete skeletons of four adults and one child. The site report does not indicate the presence of grave goods other than a small piece of red ochre. Unfortunately, the report does not contain information on the burial positions. Apparently the grave was placed on a low lying flat rather than an upland slope. There is no published report on this site.

Other sites along the lower Pipestem Creek were discovered in subsequent surveys. In 1974 (Vehik n.d.), several sites on or near Pipestem Creek were recorded. They are 32SN207 (campsite), 32SN208 (circular mounds), and 32SN210 (rock cairn) located in Sections [redacted], [redacted], and [redacted], respectively, T.[redacted]N, R.[redacted]W. Vehik's survey concentrated on the James River and not areas along Pipestem Creek.

In 1966, Oscar Mallory conducted a survey of the then proposed Pipestem Lake Project area (Mallory 1966). The 3-day reconnaissance of the pool area failed to locate any archaeological remains. Mallory's report indicates that a three-man crew walked the entire length of the reservoir and most of the lowlands. Recognizing that the survey requirements of 1966 were not as comprehensive as those of today, it remains unusual that no sites were discovered during a pedestrian survey along over 65 km of shoreline and 364 ha of bottomland. This is especially true in light of the prehistoric activity inferred by numerous sites downstream from the dam. Of course, the converse could possibly be true. With all of the activity along the James River and lower Pipestem perhaps prehistoric populations did not tend to utilize the Pipestem area, although this seems unlikely. Mallory's foresight did anticipate a problem that is occurring along the reservoir today.

> "It is recommended that after the pool has been filled and some bank slumpage has occurred that a shoreline survey be made on the possibility presently buried sites will be exposed by wave action" (Mallory 1966:2).

This has not been accomplished to date and it is strongly recommended that Mallory's advice be heeded. Site 32SN102 serves to punctuate that advice.

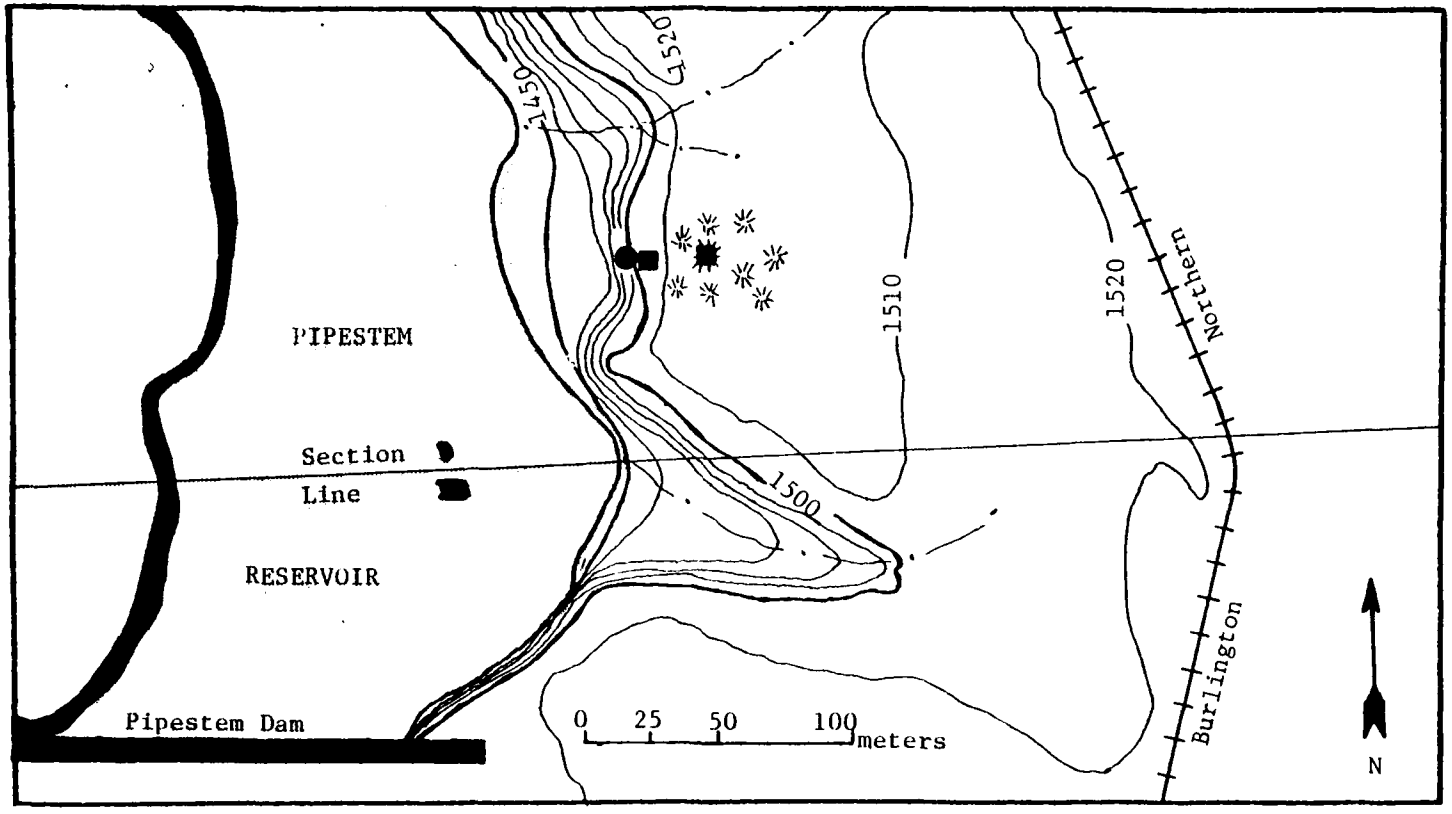


Fig. 3. Generalized Plan Map of Burial Matrix and Test Units. (10 feet contour interval)

KEY:
- burial matrix
- test units
- geologic depressions
- intermittent stream

FIELD METHODOLOGY

The fieldwork objectives were twofold, to remove the human and cultural remains from the cutbank and to determine the nature of numerous small, irregularly shaped depressions immediately above and back from the cutbank.

Irregular Depressions

The latter objective was accomplished by placing one test unit in the vicinity of each of two 10 to 15 cm-deep depressions. Test unit 1 (T-1) was located above and 1.5 m back from the cutbank area containing the human bones. The unit was 1 m square. It was excavated to a depth of 70 cm. All materials removed from the unit were excavated in natural levels and screened through one-fourth inch mesh dry screen. No cultural materials of any kind were recovered. The fill consisted of 18 cm of topsoil and 52 cm of unconsolidated sand. We encountered a large boulder, presumably part of the glacial till, in the northern half of the unit. The unit was backfilled after completion of excavation.

Excavations at T-2 also proved to be culturally sterile. This unit was similar in size to T-1 and was located 30 m upslope from the cutbank. T-2 was excavated to a depth of 30 cm. The stratigraphy was identical to that encountered at the first unit. All materials were again screened through a one-fourth inch mesh dry screen. This unit was also backfilled.

It is obvious from our investigation that the small depressions that create a pitted surface along the slope at 32SN102 are natural in origin. This interpretation is bolstered by Kresl's (1952) observations that in certain areas in the lower Pipestem Creek area, the ground moraine is quite pitted. Therefore, no further work is recommended in conjunction with these features.

Site Matrix

Recovery Methods

All of the site matrix that remained intact was excavated by hand trowel and/or smaller instruments. The slump material at the base of the cutbank was excavated with a shovel. All materials were recovered by water screening the matrices through a one-sixteenth inch water screen recovery system. Water was pumped from the reservoir and discharged along the shaly slope. Materials recovered from the screen were sorted in the field. We did not observe any cultural material (other than the osteological remains) in the screens.

The C-14 sample was made from materials recovered in situ from the cutbank. The sample came from bone associated with Individual A. After

cleaning in the water screen, the sample was allowed to dry, wrapped in tinfoil, and then placed in plastic ziplock bags to prevent contamination. The material was sent to the dating lab in this fashion.

Excavation Strategy

After reassessing the field conditions in August, we decided that overburden removal using a backhoe and subsequent excavation of a horizontal face (as stated in our proposal) was ill-advised. It was apparent that such action would virtually destroy the stratigraphy which was interpreted as essential for an understanding of the site. We, therefore, decided to excavate a vertical face into the bank and, as skeletal remains were encountered, to leave a horizontal bench at the level of the remains (Plate 2a). The bench then became the horizontal face that we desired for in situ excavation, but it was accomplished without destroying the vertical profile.

The slump material was excavated first. It was water-screened, catalogued, and bagged separate from all other materials. Thirteen small, unidentifiable bone fragments were the only materials recovered from approximately 3 m^3 of slump. The small amount of slump material indicates that most of the material that eroded from the cutbank (between September 1977 and August 1978) had disappeared prior to excavation. Apparently the material that we screened represented a recent slump.

After processing the slump material, a vertical face excavation was begun at the cutbank. The vertical face proceeded into the cutbank until the first osteological materials were encountered. These remains included most of the appendicular skeleton of Individual A. At this time, we began a bench to allow excavation of the remains in situ as we proceeded inward with the vertical face. After excavating the vertical face to a point above Individual A's cranium, we were then able to uncover the remains without disturbing their position. This procedure also allowed us to observe the relationships between the appendicular and axial skeleton.

With the exceptions of two sandy clay deposits within the site matrix, all of the excavation material from the vertical face was processed and catalogued separately. These sandy clay deposits are depicted in the unconsolidated sand in Figure 5. The small deposit to the left of A-A' (Figure 5) was also processed separately. We recovered three unidentified fragments of bone from this material.

The larger deposit (bisected by A-A') (Figure 5) yielded, along with numerous unidentifiable bone fragments, a portion of the proximal end of a clavicle (?), a first molar, two incisors, and a premolar. There was also a portion of a cervical vertebra. These are the only identifiable remains of Individuals B or C that were recovered in situ.

We also excavated and water-screened the sand, sandy clay, and clay anomaly (nearly triangular-shaped) depicted in the right portion

of the profile (Figure 5). We did not recover any cultural materials from this area. It did not receive a catalog number.

After exhuming all of the human remains we decided to excavate further into the vertical face to determine the presence/absence of additional materials. The cross section shown in Figure 5 depicts this arbitrary excavation. There were no additional remains beyond those represented by Individual A.

After completing all of these excavations, we removed the bench area and processed the dirt through the water screen. This material was also devoid of cultural materials. During excavation of the last two areas (the bench and into the vertical face), the unconsolidated sands and the very sandy clays above the human remains caved-in regularly. The end result was an amorphous cavity that obliterated much of the stratigraphic profile. Fortunately, we had recorded the profile prior to these cave-ins.

Recording

The site (32SN102) was recorded on a North Dakota Cultural Resource Survey base data form by Nick Franke in 1977. That form is included in Appendix B along with our additions/corrections on the second continuation form.

Color slides and black and white prints comprise a complete photographic record. We shot photos at all stages of excavation. The negatives are on file with UNDAR. Earlier photos taken by Franke are on file at the North Dakota Historical Society.

Catalog numbers 1 through 9 were assigned to the natural materials processed at the site. They correspond to the strata depicted in Figure 5.

Some of the natural strata were processed through the water screen separately. To maintain the discrete nature of the units during the processing, each was assigned its own catalog number. Soil samples from each stratum also received discrete catalog numbers. For example, Catalog #3 is a soil sample of the clay deposit (Catalog #2) left of A-A' (Figure 5). Soil samples aided in the slopewash interpretation (see Site Interpretations section).

Catalog #	Description
1	slump material
2	clay deposit left of A-A' (Figure 5)
3	sample from clay deposit near appendicular skeleton of Individual A
4	burial matrix (Individual A, unconsolidated sand)
5	soil sample from unconsolidated sand matrix

Catalog #	Description
6	clay deposit (Figure 5 - bisected by A-A')
7	soil sample from clay deposit bisected by A-A' (Figure 5)
8	soil sample (unconsolidated sands surrounding cranium, Individual A)
9	C-14 dating sample (bone)
10	cranium (Individual A)
11	cranium (Individual B)
12	cranium (Individual C)

We began the laboratory investigations by assigning sequential catalog numbers to the crania. We later changed to a more efficient method. This method consisted of cataloging the individual bone and dentition specimens by type (eg. femur, ulna) and then assigning the specimens, when possible, to Individual A, B, C, or D. Hence, the crania, as depicted in Plate 4 have numerical catalog numbers, while the other osteological specimens do not.

The eroded osteological material was not mixed with the excavated material during reconstruction of the individuals. All of the bone specimens assigned to Individual A are from Catalog #4. The dentition specimens identified as Individual D also came from Catalog #4. Individuals B and C were reconstructed from the bones collected by Mr. Stroh.

The slope information was determined by computing the difference in relief along a line extending from the cutbank above the burial to a point 20 m to the east. The difference in relief is 3.88 m, or approximately 4 m of relief for every 20 m.

We did not deem it necessary to establish a grid system to salvage a burial eroding from a cutbank. Therefore, there is no datum point. After concluding that the irregular depressions were not, in fact, cultural features, we deemed it unnecessary to complete a topographic plan map of the slope above the burial. We did, however, complete a general plan map (Figure 3) showing the relationship of the test units to the burial area.

SITE INTERPRETATIONS

Essentially, there are three working hypotheses applicable to the interment of the individuals at 32SN102. They are:

1) a deep grave was excavated into the sandy clay and sand matrix of the slope and the individuals subsequently interred;

2) a shallow grave was scooped into the sand and clay and the individuals were covered over and subsequently deeply buried by slopewash;

3) the individuals were left upon the surface and subsequently buried by slopewash.

To understand any of these interpretations, a knowledge of the geologic conditions at 32SN102 and the surrounding Pipestem Creek area is necessary.

The area lies in the Northern Plains on the margin of the Drift Prairie province near its contact with the Missouri Plateau. The Drift Prairie (and the Pipestem area) was heavily glaciated during Pleistocene times. The glaciation transformed the topography into a flat and rolling, nearly featureless upland plain. The melt water formed by the periodic retreat of the continental glaciers (during the Wisconsin stage) cut deep drainage channels (eg. Pipestem valley) into the plain. The surficial till left by the ice on the upland plain is composed chiefly of unconsolidated clay, buff to brown in color and with occasional stones (Kresl 1956). This till is called a ground moraine. Beneath the ground moraine lies glaciofluvial sediments associated with melt water channels and outwash plains. They consist mainly of horizontally bedded and cross-bedded sand and fine gravel (Winters 1963:61).

Evidence suggests that after the retreat of the continental glaciation and into mid-Holocene times, semiarid conditions existed through the Northern Plains. By 4000 years ago, the dry conditions began to ameliorate and the ground moraine surface was subjected to heavy erosion by the moisture. As a result, slopewash deposits of clay from the parent ground moraine tills blanketed the slopes below the upland plain (Clayton 1978:P.C.).

Figure 4 illustrates Pleistocene and Holocene conditions as they are interpreted at site 32SN102. Clayton was unable to visit the site so his interpretations are based upon aerial photo and site photo analyses. Nevertheless, the site conditions fit neatly with his hypothesis. The stratigraphic record at 32SN102 demonstrates this (Figure 5; Plate 2a). Light gray clay to yellowish sandy clay strata repose directly below the dark gray topsoil and dark brown clayey silt horizons. These gradually grade into sandy clays and finally into unconsolidated sand and

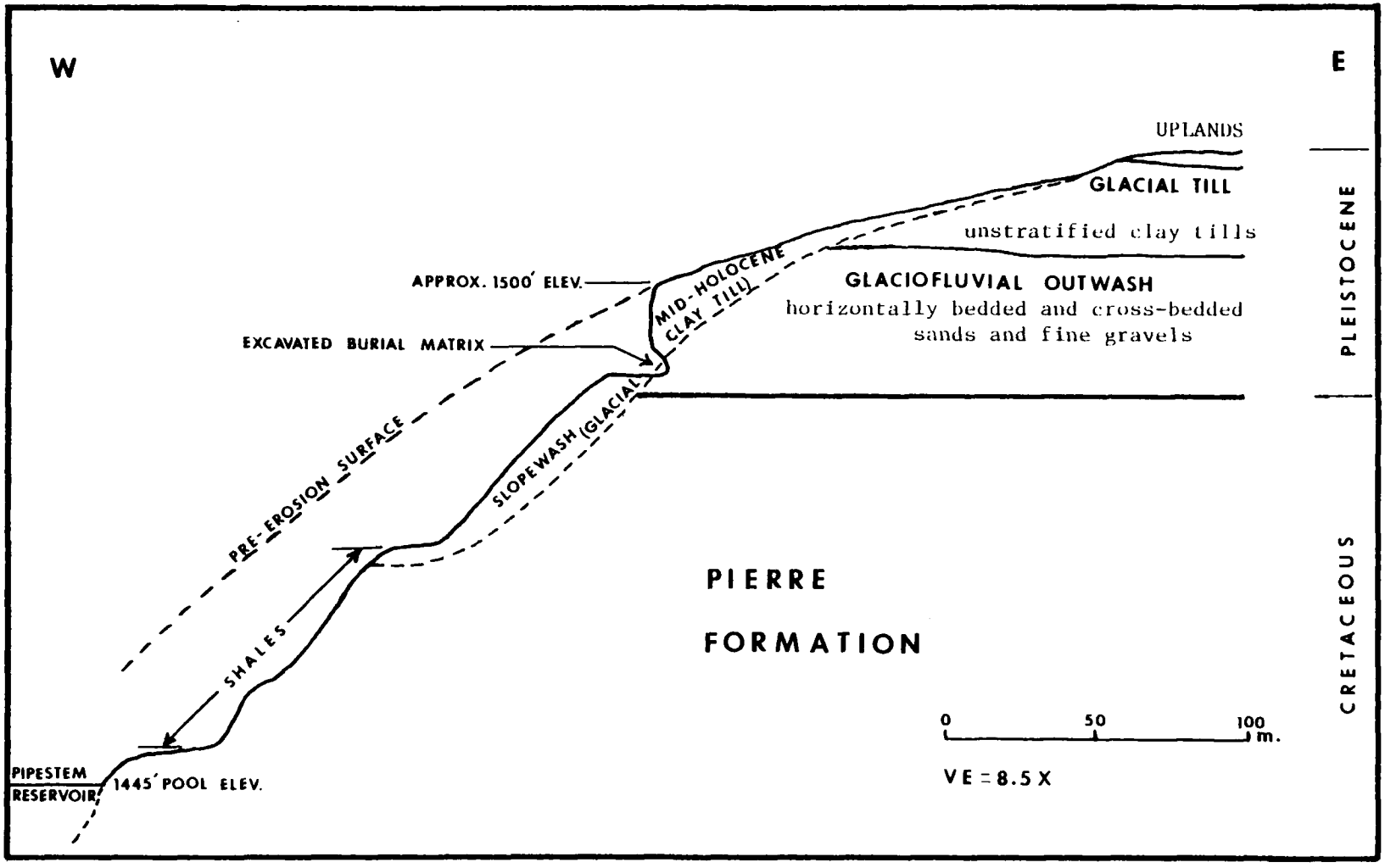


Fig.4 GENERALIZED STRATIGRAPHIC CROSS SECTION AT SITE 32SN102

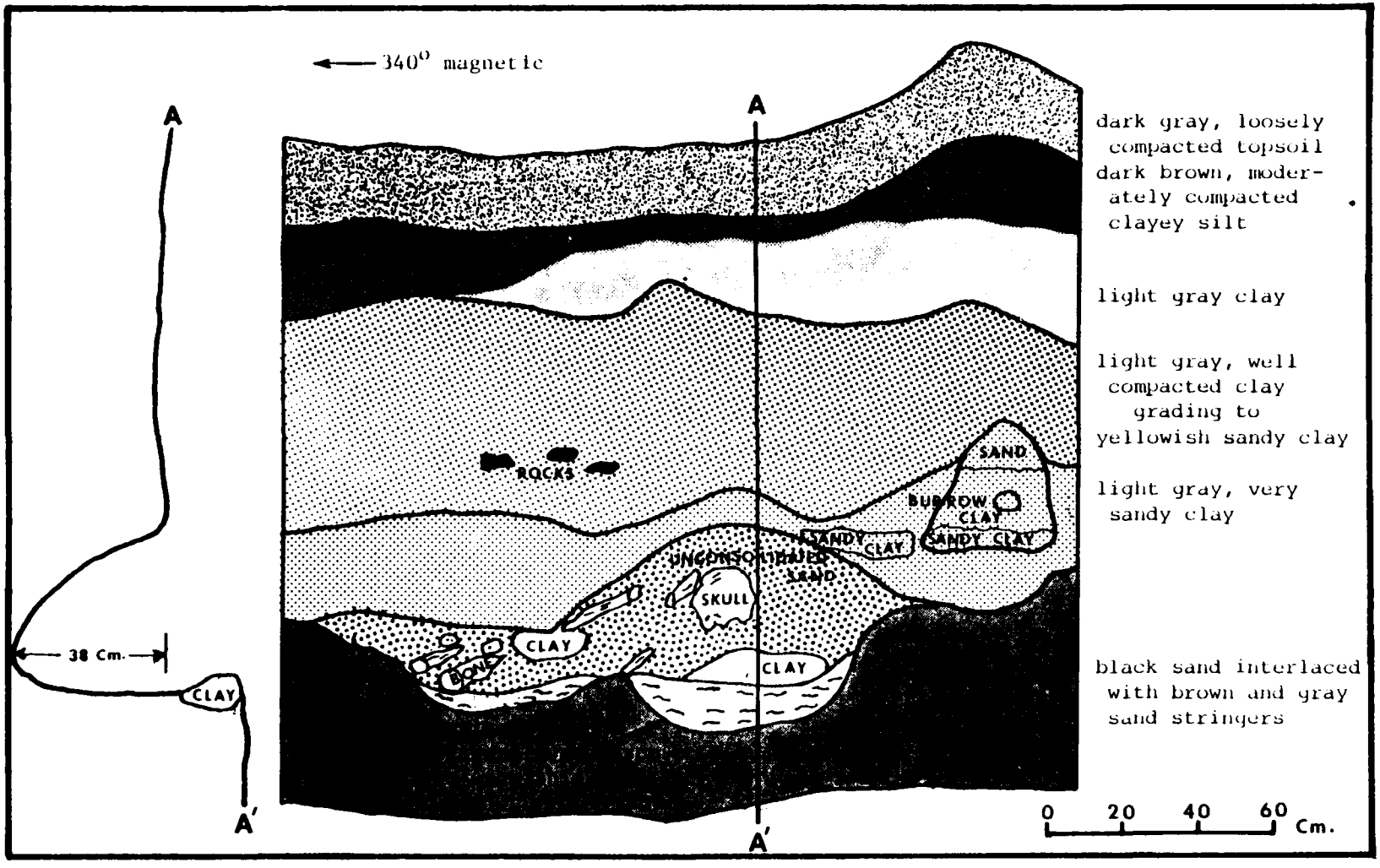


Fig. 5 BANK PROFILE 32SN102

sand strata. The clays that we encountered are interpreted as slopewash from the parent clay tills of the ground moraine. The sands are probably glaciofluvial outwash sediments deposited by melt waters as the ice margins (probably the Buchanan and Kensal lobes) retreated to the northeast.

The axial remains of Individual A (Plate 3a) were encountered in a cement-like matrix between the sandy clay and sand. The cement matrix allowed excavation above, below, and in front of the remains without disturbing the bones. The sands and sandy clays surrounding the remains, however, caved away during excavation. The cave-ins created what looks like a burial vault which is depicted in Figure 5 (labelled as unconsolidated sands). This is illusory. In actuality, we did not notice any evidence of a burial vault in the unconsolidated sands. There was no evidence of a pit in or above the remains in the vertical profile where an outline probably would have remained had a grave been dug from directly above. Had a grave been excavated into and perpendicular to the slope, all evidence has since been destroyed by lacustrine erosion. Also, much of the clay overburden has probably accumulated from slopewash activity after interment.

The only evidence remotely resembling a pit outline was encountered below the remains of Individual A. Here, concave, interlaced sand stringers varying from 1 to 4 cm thick, contrasted with the underlying black sand and horizontal sand stringers. The concave outline might be a portion of a pit bottom but this alone is inconclusive evidence. We feel that there is no extant evidence to support or refute a deep grave hypothesis, even though the skeleton occurred at a depth of 1.4 m from the present surface.

As mentioned earlier, the remains of Individual A reposed at the contact zone between the sand and sandy clay strata. This suggests the possibility that a shallow grave might have been scooped into the light gray, very sandy clay and the four individuals placed within. If so, they were subsequently buried to a depth of 1.4 m by accumulations of slopewash. Also, a scooped-out grave might account for the observed outlines in the sand profile, lending credence to the interpretation of concave sand stringers as a pit bottom.

The burial at 32SN31 (see Previous Research section) consisted of a shallow grave (70 cm X 120 cm X 90 cm) that contained the remains of four adults and one child (Wheeler 1952). If 32SN102 is similar to 32SN31, both must certainly have been secondary interments since it is hard to envision multiple primary inhumations in such a small grave. There is some evidence to suggest that, at the least, Individual A (32SN102) was a secondary interment. Although we can only speculate (perhaps this was a common burial practice circa 1500 B.C. or perhaps the remains have experienced post-interment disturbances) on the unusual extended, nearly prone position of the axial skeleton, we do know that the remains of the appendicular skeleton were piled at the base of the

spine (Plate 3b). This alone suggests a secondary interment. The lack of grave goods, although not a widespread phenomenon, does not detract from this theory. This practice (no grave offerings) is not uncommon to burials in this area, although this inference is derived from post-A.D. 1 data.

The remaining possibility suggests that the individuals at 32SN102 were left exposed and eventually covered by accumulations of slopewash common after mid-Holocene times. Clayton (1978:P.C.) is not uncomfortable with the suggestion that, under optimum conditions, skeletal remains from this period could be covered, with little disturbance, within a few years time by eroded slopewash. Such fortuitous circumstances would offer a plausible explanation for the unusual position of Individual A. Of course, a lack of grave offerings would also be expected under these conditions. This explanation, however, cannot adequately account for the apparent "secondary" nature of the appendicular remains that were excavated in situ.

We are prone to favor the shallow grave theory on the basis of the secondary burial evidence and the shallow grave at 32SN31. Regarding burial posture, it may be that there were no set procedures governing body positions in the grave. Or, perhaps a prone position was the common practice of the time. With no other verified data from this area and time period, we are hard pressed for interpretative comparative data. It is also possible that Individual A (and probably the others) was buried in haste without regard to established convention. Resolution of these options awaits additional research into the burial practices of Archaic occupants of eastern North Dakota.

The chronological interpretation (Archaic) based upon the C-14 date should be considered tentative. The C-14 date is 1255 B.C. (3205 B.P. ± 70) (UGa 2454) and is derived from the Libby half life (5570 B.P.). The interpolated bristlecone pine correction factor is 3541 B.P. (1591 B.C.) (Damon et al. 1974:357). Bone is not considered to be an excellent material for radiocarbon dating purposes. The portion of the bone subjected to dating analysis was, however, the collagen. Dating of the collagen is considered the most accurate of the various bone materials.

There are some other general indicators supporting an ancient interment. It is probable that the remains of Individual A were covered by over a meter of slopewash. It is not known precisely how long it may have taken for this deposition but considerable antiquity is suggested. As earlier observed (letter of September 19, 1977, Appendix B), the deteriorated condition of the bones also indicates considerable age. These factors combined with the C-14 date, support at least a prehistoric age interpretation.

OSTEOLOGICAL DESCRIPTION AND ANALYSIS

Description

The remains of Individual A were excavated in situ and, therefore, can be reliably assigned to a separate individual. The remains of Individuals B, C, and D were collected by a nonprofessional with no regard for archaeological considerations. When received by UNDAR they were all collected in a single box. In many cases, sorting and assignment of bones to a particular individual proved to be a difficult task, particularly between Individuals B and C. Each bone (regardless of assignment), however, is adequately described and we are confident that the total collection represents at least four individuals.

The following descriptions utilize terminology such as "deteriorated" or "missing." These descriptions are used to indicate the condition of a particular bone due to weathering. Weathering factors include antiquity (the bones have been subjected to weathering for approximately 3500 years), exposure, and, in all instances, microbal activity. Plates 5b and 5c illustrate the severe decomposition of most bones taken from the site. This condition has hindered accurate osteological measurements in many cases. These instances are so indicated in Tables 1, 2, 3, 5, and 6.

Ninety-one bones were recovered from the excavated individual (Individual A). Individual B is represented by 49 bones and Individual C is represented by 59 identifiable fragments. An infant is represented by two deciduous teeth. These teeth have been lumped together under the label of Individual D. A condensed description of the skeletal material follows.

Individual A

Cranium (Plate 4)

The cranium was represented by the presence of the occipital, frontal, both parietals, and both temporal bones. Both zygomatic bones were also present. The parietals and the occipital bones were articulated when discovered. The majority of the remainder of the cranium, excepting the facial region, was reconstructed.

The left side of the cranium was severely distorted, probably due to the weight of the overburden. Compression of the cranium also resulted in the distortion of the occipital bone. The lamboidal, coronal, basilar, and squamosal sutures were not fused. The saggital suture, however, exhibited evidence of partial closure.

Mandible (Plate 5a)

The mandible was almost completely reconstructed. The right condyle was fragmented. Thinning of the alveolar bone surrounding the

right third molar is evident due to periodontal disease in the area. A vertically oriented cut was observed on the chin. No evidence of healing was evident.

Dentition

There is little wear apparent upon the molars that are present. Wear is evident on the incisors to a small degree. No evidence of dental caries was observed. The right third molar root is abscessed.

Dentition

Maxilla	8 _ 6 5 _ 3 2 _	1 2 _ 4 5 6 7 8
Mandible	8 7 6 5 4 3 2 1	1 2 3 4 5 6 7 8
	Right Side	Left Side

5 = tooth missing, socket present
2 = tooth present, area missing
_ = tooth and area missing

Cervical Vertebrae

All of the cervical vertebrae were recovered. The axis vertebra was almost complete. The third through seventh cervical vertebrae were represented only by the recovery of the vertebral arch. The transverse and spinous processes were destroyed and the bodies of the vertebrae were not recovered.

Thoracic Vertebrae

Fragments of the vertebral arches of the fifth through twelfth thoracic vertebrae were recovered. The articular processes were intact but the spinous and transverse processes were not.

Lumbar Vertebrae

Portions of the first through fourth lumbar vertebrae were discovered. The condition of these vertebrae varied widely. The third lumbar vertebra was the most complete vertebra found during the excavation. The body and vertebral arch were still fused when discovered. The fourth lumbar vertebra was used as a radiocarbon dating sample.

Ribs

Seventeen ribs were recovered in a highly fragmented condition. The right first rib was the only numerically identifiable rib. Nine ribs were identified as right ribs; eight ribs were from the left side. In general, only the vertebral extremities remained of the ribs.

Pelvis

Three fragments of the innominate bones were recovered. One fragment of the right innominate (Plate 5b) was found. It was missing the pubis but was in good condition otherwise. The iliac crest was severely deteriorated from weathering. The acetabulum was fully fused.

The two fragments of the left innominate that were recovered were the ilium and ischium. Much of the distal portion of the ilium is deteriorated. Approximately two-thirds of the acetabulum is present.

Sacrum

Two fragments of the sacrum were recovered. Both fragments were used as radiocarbon samples.

Clavicles

Both clavicles were recovered. The sternal and scapular ends were broken (post-mortem). The conoid tubercles were still evident.

Scapulae

Only small portions of both scapulae were discovered. The glenoid cavity, a portion of the axillary border, and the basilar portions of the acromion and coracoid were the only portions of the right scapula that were found. The majority of the coracoid and a portion of the spine of the left scapula were recovered. A vast majority of the body had deteriorated, but the glenoid cavity and a portion of the axillary border remained intact.

Humerus

Both humeri were recovered. The shaft of the right humerus was discovered complete. The proximal end was broken (apparently post-mortem). The shaft of the left humerus was also complete. The proximal end was broken and the distal end was badly deteriorated. Cancellous bone tissue is evident at both ends.

Radius

Only the right radius was recovered. The distal end was broken (post-mortem), but the shaft and proximal ends were complete.

Ulna

The right ulna was recovered. The shaft was present but the distal end was deteriorated. The proximal end was also deteriorated. The left ulna was not found.

Hand

The second and fifth metacarpals were recovered. The shafts are present, but the extremities were highly deteriorated. The shaft of one proximal phalanx was also discovered.

Femur (Plate 5c)

Both femora were recovered. The shafts and proximal ends were preserved. The distal ends were severely deteriorated, particularly the heads.

Tibia

The right tibia was recovered except for the distal end. The shaft and proximal end were preserved. The left tibia had lost both extremities to weathering.

Fibula

Short segments of the shafts of both fibulae were found. Approximately 15 cm remain of each shaft. The left fibula was reconstructed from a number of fragments.

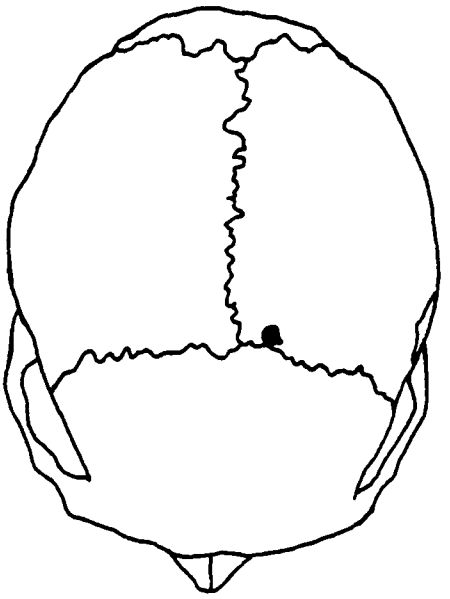
Individual B

Cranium

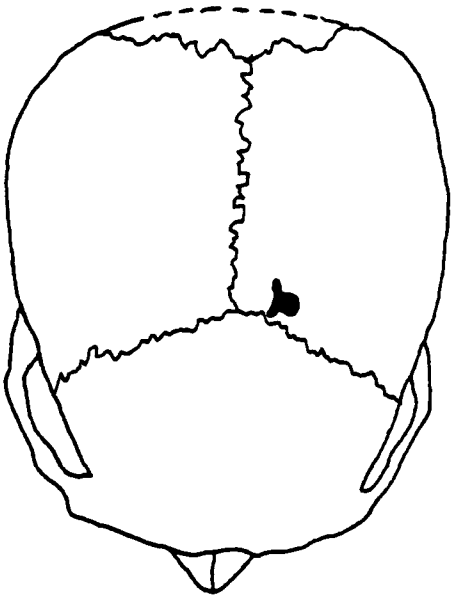
The occipital, frontal, both parietals, both temporals, both maxillae, and the left zygomatic bone were collected at the site. The parietals were articulated with the occipital bone when discovered. The vault of the cranium was fairly complete following reconstruction. The facial region was represented only by the left zygomatic and fragments of the maxillae. It was not possible to reconstruct the floor of the cranium. A small anomaly (Figure 6) was observed in the left parietal approximately 0.5 cm from the coronal suture and 1.0 cm from the saggital suture. The circular shape and regular appearance of the anomaly indicates an artificial origin. The anomaly is approximately 1.0 cm in diameter on the inner surface of the cranium and 0.5 cm on the outer surface. Pathologists at the University of North Dakota Medical School were unable to offer any conclusive explanation for this anomaly in the crania of both Individuals B and C. One pathologist suggested that it represents trepination but we feel that more detailed analysis is necessary.

Mandible

The mandible has been partially reconstructed. The left side and anterior portions of the mandible are incomplete. The left condyle and the posterior edge of the ascending ramus are not present. The right coronoid process is present as a separate fragment. The alveolar portion corresponding to the locations of the left premolars and molars reveals the pre-mortem loss of those teeth with closure and healing (absorption) of the sockets and loss of the supporting alveolar bone.



INDIVIDUAL B



INDIVIDUAL C

Fig. 6. Location of Cranial Anomalies.

Dentition

The teeth are all extremely worn. Many exhibit the dentine. The pulp cavities are exposed in several teeth.

Dentition

Maxilla	_ _ _ _ _ _ _ _	1 2 3 4 5 6 _ _
Mandible	_ 7 _ 5 4 3 2 1	1 2 3 X X 6 X _
	Right Side	Left Side

2 = tooth missing, socket deteriorated (post-mortem ?)
X = tooth missing (pre-mortem)
6 = tooth present, area missing
_ = tooth and area missing

Cervical Vertebrae

Three cervical vertebral fragments were recovered. Portions of the atlas vertebra and an unidentified cervical vertebra were found. The dens epistrophei of the axial vertebra was preserved.

Thoracic Vertebrae

Five fragments of thoracic vertebrae were collected. These fragments consisted of just the vertebral arches and the articular processes. The bodies of the vertebrae are not present and the spinous processes have been broken.

Lumbar Vertebrae

One fragment consisting of a small portion of the inferior articular process was recovered.

Pelvis

Two fragments of the right innominate were recovered. The lateral face of the ilium and a small portion of the ischium were also collected.

A small fragment of the left ischium was found. Its only identifiable feature was a portion of the lesser sciatic notch.

Clavicle

The shafts of both clavicles were recovered. The medial and distal ends are missing, but the conoid tubercles are still evident.

Humerus

The proximal portion of the shaft of the right humerus was found. Both extremities are missing (deterioration). An unhealed cut was observed on the anterior crest of the shaft.

The shaft and some of the distal extremity of the left humerus were preserved. The proximal end was broken (post-mortem). The distal end is incomplete and the olecranon fossa is only partially present.

Radius

A short length of the shaft of the left radius was found. The fragment appears to be from the central portion of the shaft.

Ulna

The proximal portion of the shaft of the left ulna was recovered. Neither extremity is present. The start of the interosseous crest is evident.

Femur

The majority of the shaft of the right femur has been reconstructed. Neither extremity is present, but the linea aspera is evident.

The proximal and distal ends of the left femur are not present, but the shaft is almost complete. The linea aspera is prominent.

The heads of two long bones have been tentatively associated with these femurs due to their shape and size. Both are fragmented and badly weathered. The small size of the fragments makes positive identification difficult.

Tibia

The distal portion of the shaft of the right tibia was recovered. Approximately 16 cm of the shaft are present. A notch observed in the anterior crest exhibits evidence of healing.

Individual C

Cranium (Plate 4)

The cranium is represented by the presence of the occipital and frontal bones, both parietals, both temporals, both maxillae, and both zygomatic bones. These bones were all highly fragmented. The anterior portion of the cranial vault and the facial region are partially reconstructed. The occipital bone was impossible to reconstruct due to the scarcity of fragments. An anomaly in the left parietal was observed (Figure 6) in the same region as the anomaly found in the cranium of Individual B. The anomaly is located in an area of thinned bone caused by the reabsorption of bone tissue under pressure from the lobes of the brain. Thinning of this type is a common occurrence. The shape of the break is amorphous. Further study is necessary to determine the nature of the break (see cranium description - Individual B).

Mandible (Plate 5a)

The mandible is nearly complete. A portion of the ascending ramus is missing. The right second molar appears to have been lost pre-mortem because a small amount of bone regrowth and healing is evident.

Dentition

The dentition of Individual C does not exhibit much molar wear. The incisors have a small amount of wear evident. The crown of the lower left second premolar is broken.

Dentition

Maxilla	8 _ _ 5 4 3 2 1	1 2 3 4 5 6 7 _
Mandible	8 7 6 5 4 3 2 1	1 2 3 4 5 6 7 8
	Right Side	Left Side

6 = tooth missing, socket present
8 = tooth present, area missing
_ = tooth and area missing

Cervical Vertebrae

The dens epistrophei of the axial vertebra and the spinous process (including the inferior articular process of a cervical vertebra) are the only identifiable fragments.

Thoracic Vertebrae

No fragments of thoracic vertebrae were found.

Lumbar Vertebrae

Two fragments of lumbar vertebrae were collected. The body and roots of the vertebral arch of the first lumbar vertebra were recovered. The left transverse process and superior articular process remained intact but the remainder of the vertebral arch was missing.

A second fragment consisted of the posterior portion of the vertebral arch of an unidentified lumbar vertebra. The inferior articular processes are the only processes remaining.

Ribs

The right first rib and the left second rib were the only identifiable ribs present. The extremities had been lost in both ribs. Seven left ribs were also recovered. The vertebral extremities and shafts were present.

Clavicle

Only a small, deteriorated portion of a clavicle is present.

Scapula

Fragments of the right and left scapulae were recovered. The fragment of the right scapula consisted of a small portion of the upper portion of the axillary border. The glenoid cavity of the left scapula was also recovered.

Humerus

The proximal half of the shaft of the left humerus was collected. The proximal and distal extremities were missing.

Foot

A right metatarsal was found which has been tentatively identified as the right fourth metatarsal. The basilar and distal extremities are missing.

Individual D

Two deciduous teeth were discovered at the site. An upper right lateral deciduous incisor and a lower left second deciduous molar were identified. Only the crown of the molar was present.

Unassignable to an Individual

Three cranial fragments could not be associated with Individuals A, B, C, or D. A fragment consisting of the petrous portion of the right temporal bone was recovered. A portion of the left temporal bone was also recovered. The fragment consisted of the squamous portion associated with the zygomatic process. A fragment of the left lateral portion of the occipital bone was collected.

Measurements

Twenty-one selected cranial measurements (Table 1) and 17 post-cranial measurements (Table 3) were taken on Individuals A, B, and C when the condition of the material permitted. The deformation of the crania and the fragmentary condition of the skeletal remains forced many of the measurements to be estimated. The tentative nature of these measurements should be taken into account when considering several of the stature estimations and cranial indices. Eleven cranial indices were calculated (Table 2), two post-cranial indices (Table 4), stature estimations were made (Table 5), and the sex of the remains were determined (Table 6). Ages were also estimated based upon suture closure, epiphysial fusion, and dentition (Table 7). In the tables, a dash (-) indicates that a measurement, index, or estimation was not possible due to incomplete or missing bone portions.

TABLE 1
After Bass (1971:62-72)
CRANIAL MEASUREMENTS

Measurement	Individual A	Individual B	Individual C
Cranium	(mm)	(mm)	(mm)
Maximum cranial length	176.5	188.5	-
Maximum cranial breadth	137.0	127.5	147.0[1]
Basion-Bregma height	130.0[1]	139.0[2]	-
Minimum frontal breadth	89.0	82.0	96.0
Total facial height	109.0[1]	-	100.5
Upper facial height	-	-	56.0
Facial width	137.0[1]	134.0[2]	-
Nasal height	-	-	46.0
Nasal breadth	-	-	28.0
Orbital height	31.0	40.0[2]	32.0
Orbital breadth	33.0	34.5	36.0
Maxillo-alveolar length	-	-	59.0[2]
Maxillo-alveolar breadth	-	-	62.0[3]
Palatal length	-	-	51.0[2]
Palatal breadth	-	-	31.5
Mandible			
Bicondylar breadth	112.0[3]	-	111.0[3]
Bigonial breadth	91.0	-	95.0
Height of ascending ramus	61.0	60.0[2]	54.0
Minimum breadth of ascending ramus	37.0	38.0[2]	35.0
Height of mandibular symphysis	29.5	31.0	28.0
Gonion-gnathion	94.0	98.0[2]	84.0

1 = Estimated measurement due to deformation of cranium.
2 = Estimated measurement because landmark was missing.
3 = Estimated measurement due to bone deterioration.

TABLE 2
After Bass (1971:63-73)
CRANIAL INDICES

Index	Individual A	Individual B	Individual C
Cranial index	77.62 mesocrany (average)	67.64 dolichocrany (narrow)	-
Cranial module	147.83[1]	151.67[1]	-
Cranial length-height index	73.65[1] orthocrany (average)	73.74[1] orthocrany (average)	-
Cranial breadth-height index	94.89[1] metriocrany (average)	109.02[1] acrocrany (high skull)	-
Fronto-parietal index	64.96 stenometopic (narrow)	64.31 stenometopic (narrow)	-
Total facial index	79.56[1] hypereuryprosopy (very broad face)	-	-
Nasal index	-	-	60.87 platyrrhiny (wide nasal aperture)
Orbital index	93.94 hypsiconchy (narrow orbits)	115.94[1] hypsiconchy (narrow)	88.89 mesoconchy (average)
Maxillo-alveolar index	-	-	105.08 dolichurany (narrow palate)
Palatal index	-	-	61.76 leptostaphyline (narrow palate)
Mean basion height index	82.93[1] medium	87.97[1] high skull	-

1 = Index based upon one or more estimated measurements.

TABLE 3
After Bass (1971:114-130, 168-187)
POST-CRANIAL MEASUREMENTS

Measurement	Individual A		Individual B		Individual C	
	Right (cm)	Left (cm)	Right (cm)	Left (cm)	Right (cm)	Left (cm)
Humerus						
Maximum diameter mid-shaft	1.90	1.80	2.50	2.35	-	1.95
Minimum diameter mid-shaft	1.40	1.40	1.80	1.70	-	1.40
Least circumference of shaft	5.40	5.30	-	6.40	-	-
Maximum length	28.1[1]	27.9[1]	-	-	-	-
Radius						
Maximum length	21.4[1]	-	-	-	-	-
Ulna						
Maximum length	24.3[1]	-	-	-	-	-
Physiological length	21.3[1]	-	-	-	-	-
Least circumference of shaft	3.60	-	-	-	-	-
Femur						
Maximum length	38.0[1]	38.2[1]	42.0[1]	-	-	-
Anterior-posterior diameter of mid-shaft	2.40	2.20	2.83	2.80	-	-
Medio-lateral diameter of mid-shaft	2.30	2.25	2.75	2.77	-	-
Maximum diameter of head	4.20[1]	4.00	-	-	-	-
Subtrochanteric anterior-posterior diameter	2.00	2.15	2.40	3.00	-	-
Subtrochanteric medio-lateral diameter	2.70	2.80	2.65	2.80	-	-
Tibia						
Maximum length	28.9[1]	29.1[1]	-	-	-	-
Anterior-posterior diameter at nutrient foramen	2.90	2.90	2.72	-	-	-
Medio-lateral diameter at nutrient foramen	1.98	1.85	2.00	-	-	-

1 = Estimated measurement.

TABLE 4
After Bass (1971:169-170, 187)
POST-CRANIAL INDICES

Individual		Platymeric Index (Femur)	Platycnemic Index (Tibia)
Individual A:	Right	74.1 platymeric (broad)	68.3 mesocnemic
	Left	76.8 platymeric (broad)	63.8 mesocnemic
Individual B:	Right	98.6 eurymeric (average)	73.5 eurymeric
	Left	107.1 stenomeric (pathological)	-

TABLE 5
After Bass (1971:118, 125, 132, 175, 190)
STATURE ESTIMATIONS

Long Bone	Individual A (cm)	Individual B (cm)	Individual C (cm)
Humerus	147.9-156.8	-	
Radius	152.1-160.6	-	No
Ulna	157.2-165.8	-	Estimate
Femur	144.7-152.2	159-167[1]	Possible
Tibia	142.3-149.6	-	

1 = Tentative estimate.
(See also Appendix D)

TABLE 6
After Bass (1971:72-74, 156-162, 173-174)
SEX DETERMINATION

Indicator	Individual A	Individual B	Individual C
CRANIAL FEATURES			
Supra-orbital ridges	F (sharp)	M (blunt)	F (sharp)
Mandible	M? (square)	M? (square)	M? (square)
Cranial vault	F? (gracile)	M? (robust)	F (gracile)
External occipital protuberance	F (small)	M? (prominent)	-
Zygomatic process	F? (medium crest)	F? (medium crest)	F? (medium crest)
Mastoid process	F (small)	M (large)	-
POST-CRANIAL FEATURES			
Innominate			
Sciatic notch	F (wide)	-	-
Sacro-iliac joint	M? (flat)	-	-
Pre-auricular sulcus	F (present)	-	-
Femur			
Diameter of head	F (40-42 cm)	-	-
FINAL SEX DETERMINATION	Female	Male	Female

F = Female
M = Male
? = Indefinite indicator

TABLE 7

AGE DETERMINATION

Indicator	Individual A	Individual B	Individual C	Individual D
EPIPHYSES (Bass 1971)				
Humerus	19+ medial epicondyle fused	19+ medial epicondyle fused	-	-
Scapula	18+ glenoid cavity fused	-	-	-
Ulna	15+ proximal end fused	-	-	-
Radius	16+ proximal end fused	-	-	-
Femur	18+ head fused	-	-	-
Tibia	18+ proximal end fused	-	-	-
DENTITION (Bass 1971)	18+ 3rd molars present	-	18+ 3rd molars present	2-6 second deciduous molar present
MOLAR WEAR (Brothwell 1965)	17-25	35-45	17-25	-
SUTURE CLOSURE (Anderson 1969)	21-35 1	36-55 2	21- 3	-
FINAL AGE ESTIMATE	19-25 yrs.	40-50 yrs.	18-21 yrs.	2-6 yrs.

1 The saggital suture exhibited partial closure.
2 The saggital, coronal and lamboidal sutures were closed. The lamboidal suture closes at age 45.
3 The saggital suture was not closed.

Analysis

Individual A

A final age estimate of from 19 to 25 years is indicated for Individual A. The medial epicondyle of the humerus has fused (approximately 19+ years). Molar wear using Brothwell's (1965) tooth wear chart yields an age range of from 17 to 25 years. These figures correspond well with the other indications of age (see Table 7).

The vast majority of the sex indicators suggest that Individual A was female. This estimation is based upon both the pelvis and cranium, which are the two most reliable regions for sex determination.

Stature estimations yield an approximate height of from 145 to 152 cm for Individual A. This is based upon the calculations made using measurements of the femur. The femur provides the most accurate stature estimations (Bass 1971). This height range agrees fairly well with the other calculated stature estimations (Table 4).

The only unusual feature noted during the analysis of Individual A was an apparent cut upon the chin of the mandible. The cut was oriented vertically and the bone did not exhibit any evidence of healing.

Individual B

The age of Individual B was estimated at 40 to 50 years. This estimate was based upon molar wear and suture closure. Brothwell's (1965) tooth wear chart yielded a range of from 35 to 45 years. Tooth wear, however, is highly variable among native populations (Bass 1971). Suture closure provides a more reliable estimate in this case. The saggital, coronal, and lamboidal sutures are fused providing an estimate of from 36 to 55 years of age (the lamboidal suture closes at approximately 45 years).

The sex determination of male for Individual B was based only upon the cranial features. The rugosity of the supra-orbital ridges and mastoid processes are definitely masculine. Other indices are less conclusive but appear to be masculine (Table 6).

Stature estimates for Individual B are highly tentative due to the fragmented condition of the reconstructed long bones. A height of 160 to 165 cm can be proposed as an approximate estimation of Individual B's stature.

Individual B exhibited several unusual features. The left femur produced a stenomeric platymeric index which is usually found only in pathological cases (Bass 1971). An artificial anomaly was observed in the left parietal near the bregma. The break was circular with a diameter of 0.5 cm on the outer surface and 1.0 cm on the inner surface. Some evidence of healing was observed. No definite statement concerning the origin of the anomaly can be made without more advanced analysis.

Individual C

Individual C appears to have died at an age of from 18 to 21 years. Tooth wear and the presence of the third molar indicate an age of 18+ years. The saggital suture, which closes at 21 years of age, was not fused.

Cranial sex indicators exhibited mostly female characteristics (see Table 6). Determination using the pelvis was impossible because the pelvis was not recovered from the site.

No stature estimations were possible. The shaft of the left humerus was the only long bone recovered. Its fragmentary condition prevented its use in any stature estimations.

An anomaly was noted in the left parietal in the same region as the anomaly observed in Individual B. The outline of the break was indefinite. The anomaly was in an area of thinned bone due to reabsorption of bone tissue. Further investigation is required to produce any reliable statement regarding the cause or origin of the break.

Child (Individual D)

A deciduous incisor and second molar were recovered from the burial. These teeth are the only material identifiable with the child. Presence of the deciduous second molar provides a tentative age estimate of from 2 to 6 years. No sex determination was possible.

Conclusion

The site consisted of at least four individuals:

Individual A:	female, age 19 to 25 years, 145 to 152 cm in height.
Individual B:	male, age 40 to 50 years, approximately 160 to 165 cm in height.
Individual C:	female, age 18 to 21 years, no stature estimation possible.
Individual D:	(child), age 2 to 6 years, sex undetermined, stature undetermined.

Other osteological materials which could not be assigned may represent other individuals.

Anomalies in the crania from Individual B and C may or may not be pathological. UND pathologists were unable to supply definite conclusions. It is recommended that consulting fees be made available so that qualified scientists can analyze these phenomena.

SUMMARY

Site 32SN102 is located in Stutsman County, North Dakota, on the east shore of a manmade reservoir, Pipestem Lake. The site contained the remains of at least four humans; there were no cultural materials associated with them. The human remains have been radiocarbon dated at 1591 B.C. ± 70. The human bone was exposed in the cutbank primarily through lacustrine erosion. The evidence suggests that the individuals may have been secondarily interred in a shallow grave that was subsequently covered to a depth of about 1.4 m by slopewash. Only the remains from one individual were recovered in situ. The others were either disturbed by erosion or pothunting activities.

Osteological analysis indicates the following age, sex, and stature information:

Individual A:	female, from 19 to 25 years of age, 145 to 152 cm in height.
Individual B:	male, from 40 to 50 years of age, 160 to 165 cm in height.
Individual C:	female, from 18 to 21 years of age, no stature estimation possible.
Individual D:	infant, from 2 to 6 years of age, sex and stature undetermined.

RECOMMENDATIONS

All of the cultural materials at 32SN102 have been removed to the laboratory. There is no longer any extant archaeological evidence at the site. No further field work is necessary. Because the site's integrity has been obliterated by erosion, pothunting, and professional investigations, we are of the opinion that the site does not qualify for nomination to the National Register of Historic Places.

As early as 1966, Mallory (1966:2) anticipated the problem of shoreline erosion at the then proposed Pipestem Lake and its destructive effect upon known and unknown cultural resources. He suggested that a survey be conducted to correct this problem. Site conditions at 32SN102 serve to underlie the importance of this recommendation. It has been approximately 3.5 years since the lake began actively eroding the shoreline. In light of this, Mallory's suggestions, and the loss of much of 32SN102, we recommend that the Corps instigate, as soon as possible, a cultural resource survey of the Pipestem Lake Project area. This survey should include an intensive pedestrian investigation:

1) of all exposed shoreline and cutbanks from the shoreline to a contour elevation equal to maximum pool elevation;

2) up to a contour elevation of at least 15 m or greater, above maximum pool elevation where it is evident that lacustrine and/or runoff erosion will threaten a potential resource;
3) of all areas of potential resources that are made readily accessible to humans by the presence of the reservoir or access roads, trails, and the like. This recommendation is made on the premise that man is of equal threat to the resource; and,
4) of all bays, channels, and runoff drainages peripheral to the lake subject to the same conditions outlined in 1 through 3 above.
5) In addition, we recommend that a thorough records and literature search be conducted in conjunction with the intensive survey.

We envision the cultural resource investigations at Pipestem Dam as proceeding in three phases. Phase I includes the literature search and survey field work. It is designed to identify, locate, describe, and analyze sites on the basis of surface data so that management option recommendations can be provided. Phase II consists of testing operations to determine site significance. Phase III would conclude the investigations with the implementation of a professionally acceptable cultural resource management plan.

To conclude, we also recommend that a paleopathologist be consulted regarding the nature and origin of the cranial anomalies detected in Individuals B and C.

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APPENDIX A

Plates

PLATE 1a. Cutbank prior to excavation (32SN102). Note degree of bank slope. Unexposed portion of burial is above white rock.

PLATE 1b. Cutbank and slump material at 32SN102 prior to excavation.

PLATE 2a. Individual A (32SN102) and bank profile.

PLATE 2b. Remains of Individual A in situ (32SN102).

PLATE 3a. Cranium and portions of axial skeleton, Indiviual A, 32SN102.

PLATE 3b. Appendicular skeleton (Individual A) excavated in situ. Note association of appendicular skeleton with the ribs (right of picture) and rest of axial skeleton in Plate 3a.

PLATE 4. Crania from 32SN102.

PLATE 5a. Mandibles, 32SN102. Left to right, Individuals A & C. Bottom is Individual B.

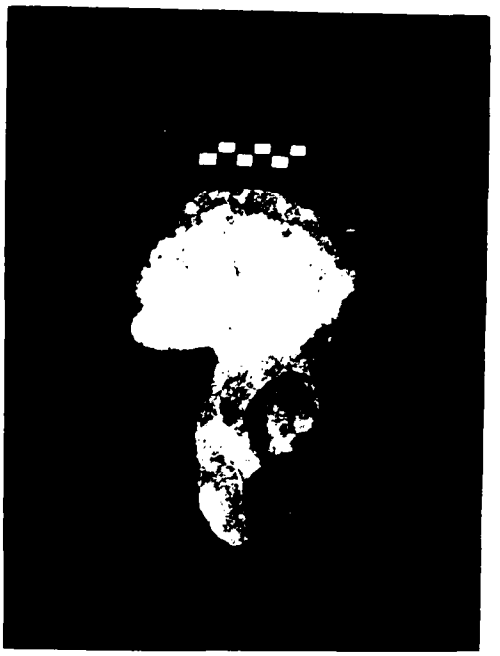


PLATE 5b. Right innominate, Individual A (32SN102), note bone deterioration.

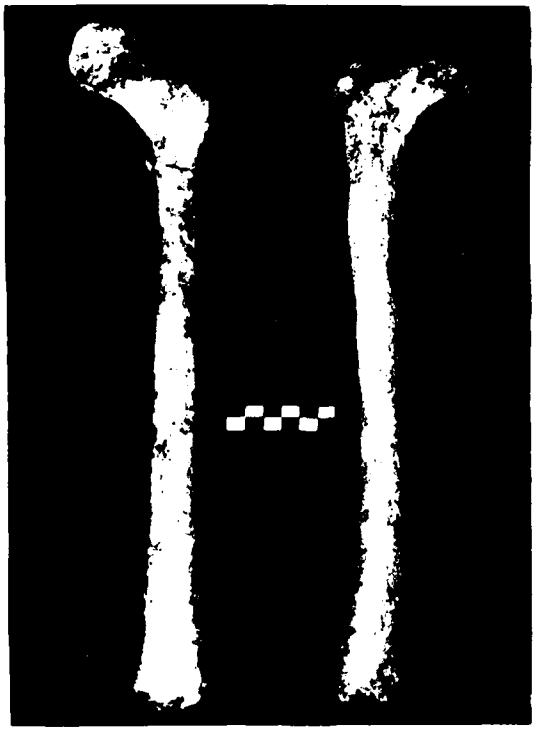


PLATE 5c. Femora, Individual A, 32SN102.

APPENDIX B

Miscellaneous

THE UNIVERSITY OF NORTH DAKOTA
GRAND FORKS 58202

DEPARTMENT OF ANTHROPOLOGY AND ARCHAEOLOGY

TELEPHONE: (701) 777-3069

September 19, 1977

John E. Velehradsky, P. E.
Planning Division
Omaha District, Corps of Engineers
6014 Post Office and Court House
Omaha, Nebraska 68102

Dear Mr. Velehradsky:

This letter is response to my telephone conversations of 13 September 1977 with Boyd Clauson, your letter of 15 September 1977, and purchase order No. Plng-77-97 requesting an initial investigation of a burial reported to be eroding from the shoreline of the Pipestem Reservoir, northwest of Jamestown, Stutsman County, North Dakota.

A preliminary, on-site investigation was conducted on 16 September 1977 by Richard A. Fox, a research associate in theDepartment of Anthropology and Archeology and a qualified professional archeologist.

The site, initially discovered by Mr. Tom Stroh of Jamestown, North Dakota, has been given site number 32SN102, having the legal description [redacted] of the [redacted] of Sec. [redacted], T. [redacted] N., R. [redacted] W. The site consists of human bone exposed by shoreline erosion in a vertical cutbank on the eastern shore of Pipestem Reservoir. Examination of the site revealed additional human bone in situ approximately 1.2 meters below the original ground surface, and at an elevation well below the maximum reservoir pool elevation. The land adjacent to the cutbank exposure is grass and shrub covered and slopes at an estimated grade of 2-3% toward the reservoir. The ground surface immediately above and back from the cutbank is characterized by numerous small, irregularly shaped depressions 10-15 cm deep and of unknown origin. A large boulder is situated directly over the human bones exposed in the cutbank, and several smaller boulders are in the immediate site area, suggesting that stones may have filled the grave or that a burial cairn may have originally covered the bones.

During the site inspection Mr. Fox collected a small number of human bones from the cutbank, but left other specimens in place within the site matrix. No diagnostic artifacts were reported or were observed in association with the human remains, although a single Knife River Flint flake of probable prehistoric origin was found in the site shoreline area. All human skeletal remains from the site, including those found by Mr. Stroh, were transferred by Mr. Martin to the University for our examination. Preliminary observations indicate the presence of at least three individuals including a mature adult with extremely worn teeth and

two adolescents. No complete skeleton exists for any of the three individuals, and all of the bones present are very fragmentary. Bones present include crania, mandibles, vertebrae, long bones, ribs and several smaller elements. All bones are brittle and partially decomposed; all exterior surfaces have been eroded by some type of microbial activity. Bones freshly removed from the cutbank exhibit weathering and alteration equal to all other specimens, indicating that the decomposition of the bones is probably attributable to the age of the deposits rather than to recent exposure on the shoreline.

Taken alone, the condition of the bones strongly suggests considerable age for the skeletal materials; we would suggest that they are several hundred years or prehistoric in age. The lack of Euro-American artifacts, the general burial conditions, and the extreme tooth wear all indicate that the skeletal materials can be attributed to a prehistoric Native American population, of unknown age and cultural origin.

Even though the site has been disturbed by erosion and uncontrolled excavation, it is clear that additional human skeletal materials remain in situ within the site matrix. Due to the site location, it appears that future reservoir fluctuations will eventually expose these remains, and it is even more likely that the remainder of the site will be disturbed by amatuer excavation or vandalism. Given these circumstances, we would recommend that the Corps of Engineers sponsor limited additional investigation of the site to be conducted by a qualified professional archeologist. We would recommend salvage excavation of the remaining human materials in the cutbank and descriptive analysis of osteological materials. Controlled excavations would be conducted to clarify the stratigraphic position and burial arrangement for the skeletal materials, and to recover any associated artifacts and clarify the cultural affiliation of the site. Analysis would consider all site materials and would produce age, sex, and measurement data on the human remains. A short report would be written on all future work conducted at the site.

Thank you for your prompt actions concerning site 32SN102. If there are further questions, please do not hesitate to contact either me or Richard A. Fox.

Sincerely yours,

Stanley A. Ahler
Research Archeologist

cc: North Dakota SHPO's office

CENTER FOR APPLIED ISOTOPE STUDIES

THE UNIVERSITY OF GEORGIA

RIVERBEND RESEARCH LABORATORY
110 RIVERBEND RD. ATHENS, GA. 30602
(404) 542-5579

November 30, 1978

Dr. Richard A. Fox, Jr.
Dept. of Anthropol & Archaeology
University of North Dakota
Grand Forks, N.D. 58202

Dear Dr. Fox:

The C^{14} date for the bone submitted from Pipestem Burial Site, 32 SN 102, is:

UGa-2454	3205 + 70 B.P.
	1255 $\overline{BC}$

The Libby half-life (5570 years) is used in the calculations.

Yours truly,

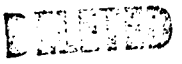
Betty Lee Brandau

Betty Lee Brandau
Associate Director

BLB:cm

Enclosure

APPENDIX C



Historic Information

APPENDIX D

Cranial Indices and Stature Estimate Formulas

APPENDIX D

Cranial Indices (After Bass 1971)

Cranial Index (Bass 1971:63)	=	$\frac{\text{maximum cranial breadth X 100}}{\text{maximum cranial length}}$
Cranial Module (Bass 1971:64)	=	$\frac{\text{length + breadth + height}}{3}$
Cranial Length-Height Index (Bass 1971:64)	=	$\frac{\text{basion-bregma height X 100}}{\text{maximum length}}$
Cranial Breadth-Height Index (Bass 1971:65)	=	$\frac{\text{basion-bregma height X 100}}{\text{maximum breadth}}$
Fronto-Parietal Index (Bass 1971:67)	=	$\frac{\text{minimum frontal breadth X 100}}{\text{maximum cranial breadth}}$
Total Facial Index (Bass 1971:68)	=	$\frac{\text{total facial height X 100}}{\text{bizygomatic breadth}}$
Nasal Index (Bass 1971:69)	=	$\frac{\text{nasal breadth X 100}}{\text{nasal height}}$
Orbital Index (Bass 1971:69)	=	$\frac{\text{orbital height X 100}}{\text{orbital breadth}}$
Maxillo-Alveolar Index (Bass 1971:71)	=	$\frac{\text{maxillo-alveolar breadth X 100}}{\text{maxillo-alveolar length}}$
Palatal Index (Bass 1971:71)	=	$\frac{\text{maximum palatal breadth X 100}}{\text{maximum palatal length}}$
Mean Basion-Height Index (Bass 1971:65)	=	$\frac{\text{basion-bregma height X 100}}{\frac{\text{cranial length + breadth}}{2}}$

Stature Estimate Formulas (after Bass 1971)

Humerus:	male mongoloid	2.68 humerus + 83.19 ± 4.16
	female white[1]	3.36 humerus + 57.97 ± 4.45
Radius:	male mongoloid	3.54 radius + 82.00 ± 4.60
	female white[1]	4.74 radius + 54.93 ± 4.24
Ulna:	male mongoloid	3.48 ulna + 77.45 ± 4.66
	female white[1]	4.27 ulna + 57.76 ± 4.30

Stature Estimate Formulas (continued)

Femur:	male mongoloid	2.15 femur + 72.57 ± 3.80
	female white[1]	2.47 femur + 54.10 ± 3.72
Tibia:	male mongoloid	2.39 tibia + 81.45 ± 3.27
	female white[1]	2.90 tibia + 61.53 ± 3.66

1 = Data on mongoloid females are difficult to obtain. Stature formulas for white females are used in the Stature Table (Table 5). The raw data is available in Table 3 should future researchers wish to calculate stature for mongoloid females. We present alternative calculations below. They are based on living Mesoamerican populations.

Additional Stature Estimation (after Genoves 1967:76)

Individual A:

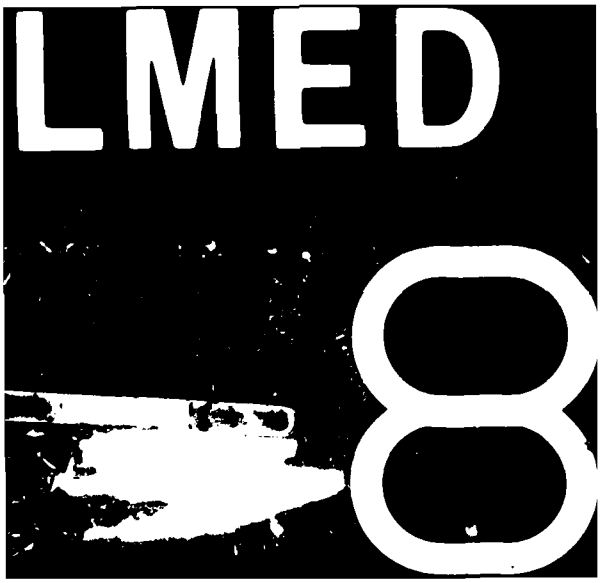
Right femur: 144.976 cm to 151.978 cm
Left femur : 144.864 cm to 152.496 cm

Right Tibia: 138.876 cm to 145.902 cm
Left Tibia : 139.420 cm to 146.446 cm

Mesoamerican Stature Formulas:

2.59 femur + 49.742 ± 3.816

2.72 tibia + 63.781 ± 3.513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